

1 We claim:

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4 1) A signal processing system for a wireless
5 communications system, said signal processing system
6 comprising:

7 a baseband receiver having one or more control inputs
8 and a status output;

9 a transmit modulator having a quadrature input, one or
10 more control inputs, and a status output;

11 a baseband receive processor having one or more control
12 outputs;

13 a baseband transmit processor having a quadrature
14 output, a control output, and a transmit enable output;

15 a first multiplexer having an output, said output
16 selecting either:

17 one of said baseband receive processor control outputs

18 or one of said baseband transmit processor quadrature
19 outputs , said first multiplexer making a selection based on
20 said transmit enable, said first multiplexer output coupled
21 to a first digital to analog converter (DAC), said first DAC
22 output coupled to one of said transmit modulator quadrature
23 inputs and also to one of said baseband receiver control
24 inputs;

1 a second multiplexer having an output, said output
2 selecting either:

3 other said baseband receive processor control output or
4 the other of said baseband transmit processor quadrature
5 output, said second multiplexer making a selection based on
6 said transmit enable, said second multiplexer output coupled
7 to a second digital to analog converter (DAC), and
8 delivering said second DAC output to the other of said
9 transmit modulator quadrature inputs and also to the other
10 of said baseband receiver control inputs;

11 a third multiplexer having an output, said output
12 selecting either said baseband receiver status signal or
13 said transmit modulator status signal, said third
14 multiplexer output making a selection based on said transmit
15 enable, said third multiplexer output coupled to a first
16 analog to digital converter, the output of said analog to
17 digital converter coupled to said baseband receive processor
18 status signal and also to said baseband transmit processor
19 status signal.

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21 2) The signal processing system of claim 1 where said
22 first multiplexer couples one of said baseband receive
23 processor control signals to said first DAC when said
24 transmit enable is not active.

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1 3) The signal processing system of claim 2 where said
2 baseband receive processor control signal is a gain control
3 signal.

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5 4) The signal processing system of claim 1 where said
6 first multiplexer couples one of said baseband transmit
7 processor quadrature signals to said first DAC when said
8 transmit enable is active.

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10 5) The signal processing system of claim 1 where said
11 second multiplexer couples one of said baseband receive
12 processor control signals to said second DAC when said
13 transmit enable is not active.

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15 6) The signal processing system of claim 5 where said
16 baseband receive processor control signal is a gain control
17 signal.

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19 7) The signal processing system of claim 1 where said
20 second multiplexer couples one of said baseband transmit
21 processor quadrature signals to said second DAC when said
22 transmit enable is active.

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1 8) The signal processing system of claim 1 where said
2 third multiplexer couples said baseband receiver status
3 signal to said ADC when said transmit enable is not active.
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5 9) The signal processing system of claim 8 where said
6 baseband receiver status signal is receive signal strength
7 indication.
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9 10) The signal processing system of claim 1 where said
10 third multiplexer couples said transmit modulator status
11 signal to said third ADC when said transmit signal is
12 active.
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14 11) The signal processing system of claim 10 where said
15 transmit modulator status signal is a transmit power
16 strength.
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18 12) The signal processing system of claim 1 where at
19 least one of said baseband receive processor or said
20 baseband transmit processor is a digital circuit.
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22 13) The signal processing system of claim 12 where said
23 digital circuit is an integrated circuit.
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1 14) The signal processing system of claim 12 where said
2 digital circuit is a field programmable gate array (FPGA).

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4 15) A signal processing system for a wireless
5 communications system, said signal processing system
6 comprising:

7 a baseband receiver having one or more control inputs
8 and a status output;

9 a transmit modulator having a quadrature input, one or
10 more control inputs, and a status output;

11 a baseband receive processor having one or more control
12 outputs;

13 a baseband transmit processor having a quadrature
14 output, a control output, and a transmit enable output;

15 a first multiplexer having an output, said output
16 selecting one of:

17 said baseband receive processor control output or one
18 of said baseband transmit processor quadrature outputs, said
19 first multiplexer making a selection based on said transmit
20 enable, said first multiplexer output coupled to a first
21 digital to analog converter (DAC), said first DAC output
22 coupled to one of said transmit modulator quadrature inputs
23 and also to one of said baseband receiver control inputs;

24 a second multiplexer having an output, said output
25 selecting either:

1 other said baseband receive processor control output or
2 the other of said baseband transmit processor quadrature
3 outputs, said second multiplexer making a selection based on
4 said transmit enable, said second multiplexer output coupled
5 to a second digital to analog converter (DAC), and
6 delivering said second DAC output to the other of said
7 transmit modulator quadrature inputs and also to the other
8 of said baseband receiver control inputs.
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10 16) The signal processing system of claim 15 where said
11 first multiplexer couples one of said baseband receive
12 processor control signals to said first DAC when said
13 transmit enable is not active.
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15 17) The signal processing system of claim 16 where said
16 baseband receive processor control signal is a gain control
17 signal.
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19 18) The signal processing system of claim 15 where said
20 first multiplexer couples one of said baseband transmit
21 processor quadrature signals to said first DAC when said
22 transmit enable is active.
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24 19) The signal processing system of claim 15 where said
25 second multiplexer couples one of said baseband receive

1 processor control signals to said second DAC when said
2 transmit enable is not active.

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4 20) The signal processing system of claim 19 where said
5 baseband receive processor control signal is a gain control
6 signal.

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8 21) The signal processing system of claim 15 where said
9 second multiplexer couples one of said baseband transmit
10 processor quadrature signals to said second DAC when said
11 transmit enable is active.

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13 22) The signal processing system of claim 1 or 15 where
14 said baseband receiver quadrature outputs and said transmit
15 modulator quadrature input signals are analog signals.

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17 23) The signal processing system of claim 1 or 15 where
18 said baseband receive processor quadrature inputs and said
19 baseband transmit processor outputs are digital signals
20 having more than one bit of width.

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22 24) A signal processing system for a wireless
23 communications system, said signal processing system
24 comprising:

1 a baseband receiver having one or more control inputs,
2 quadrature outputs, and a status output;
3 a transmit modulator having a quadrature input, one or
4 more control inputs, and a status output;
5 a baseband receive processor having one or more control
6 outputs, a multiplexer control, and a quadrature input;
7 a baseband transmit processor having a quadrature
8 output, a sample output, and a transmit enable output;
9 a first multiplexer having an output which selects
10 between one of:
11 said baseband receive processor control outputs or one
12 of said baseband transmit processor quadrature outputs in
13 response to said transmit enable, said first multiplexer
14 output coupled to a first digital to analog converter (DAC),
15 and delivering said first DAC output to one of said transmit
16 modulator quadrature inputs and also to one of said baseband
17 receiver control inputs;
18 a sample and hold having an input coupled to said first
19 DAC output and an output coupled to one of said transmit
20 modulator control signals, said sample and hold controlled
21 by said baseband transmit processor said sample output;
22 a second multiplexer having an output, said second
23 multiplexer output coupled to one of:
24 other said baseband receive processor control output or
25 the other of said baseband transmit processor quadrature

1 output in response to said transmit select, said second
2 multiplexer output coupled to a second digital to analog
3 converter (DAC) and delivering said second DAC output to the
4 other of said transmit modulator quadrature inputs and also
5 to the other of said baseband receiver control inputs;
6 a third multiplexer having an output, said third
7 multiplexer output coupled to either of:
8 one of said baseband receiver quadrature outputs or
9 said baseband receiver status signal in response to said
10 baseband receiver processor said multiplexer control, said
11 third multiplexer output coupled to a first analog to
12 digital converter, the output of said analog to digital
13 converter coupled to said baseband receive processor status
14 signal and also to one of said baseband receiver quadrature
15 inputs;
16 a fourth multiplexer having an output, said fourth
17 multiplexer output coupled to one of:
18 the other said baseband receiver quadrature output or
19 said transmit modulator status signal, said fourth
20 multiplexer selection controlled by said baseband transmit
21 processor said transmit enable, said fourth multiplexer
22 output coupled to a second analog to digital converter
23 (ADC), the output of said second ADC coupled to the other
24 said receive processor quadrature input and said baseband
25 transmit processor status signal.

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25) The signal processing system of claim 24 where said first multiplexer couples one of said baseband receive processor control signals to said first DAC when said transmit enable is not active.

26) The signal processing system of claim 25 where said baseband receive processor control signal is a gain control signal.

27) The signal processing system of claim 24 where said first multiplexer couples one of said baseband transmit processor quadrature signals to said first DAC when said transmit enable is active.

28) The signal processing system of claim 24 where said second multiplexer couples one of said baseband receive processor control signals to said second DAC when said transmit enable is not active.

29) The signal processing system of claim 28 where said baseband receive processor control signal is a gain control signal.

1 30) The signal processing system of claim 24 where said
2 second multiplexer couples one of said baseband transmit
3 processor quadrature signals to said second DAC when said
4 transmit enable is active.

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6 31) The signal processing system of claim 24 where said
7 third multiplexer couples said baseband receiver status
8 signal to said ADC when said receive processor said
9 multiplexer control is not active.

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11 32) The signal processing system of claim 31 where said
12 baseband receiver status signal is receive signal strength
13 indication.

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15 33) The signal processing system of claim 24 where said
16 third multiplexer couples one of said baseband receiver
17 quadrature outputs to said first ADC when said receiver
18 processor said multiplexer control is active.

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20 34) The signal processing system of claim 24 where a
21 transmit gain value is placed on one of said baseband
22 transmit processor quadrature outputs and said sample output
23 is active.

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1 35) The signal processing system of claim 24 where at
2 least one of said baseband receive processor or said
3 baseband transmit processor is a digital circuit.
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5 36) The signal processing system of claim 35 where said
6 digital circuit is an integrated circuit.
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8 37) The signal processing system of claim 35 where said
9 digital circuit is a field programmable gate array (FPGA).
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11 38) The signal processing system of claim 1 where said
12 first multiplexer includes a test input which is coupled to
13 said first DAC or to said DAC, selectable by said transmit
14 enable.
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16 39) The signal processing system of claim 1 where said
17 second multiplexer includes a test input which is coupled to
18 said first DAC or to said second DAC, selectable by said
19 transmit enable.
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21 40) The signal processing system of claim 15 where said
22 first multiplexer includes a test input which is coupled to
23 said first DAC or to said DAC, selectable by said transmit
24 enable.
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1 41) The signal processing system of claim 15 where said
2 first multiplexer includes a test input which is coupled to
3 said first DAC or to said DAC, selectable by said transmit
4 enable.

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7 42) The signal processing system of claim 24 where said
8 third multiplexer includes a test input which is coupled to
9 said first DAC or to said DAC.

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12 43) The signal processing system of claim 24 where said
13 fourth multiplexer includes a test input which is coupled to
14 said first DAC or to said DAC.

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1 ABSTRACT

2 A baseband receiver having quadrature analog outputs
3 and a plurality of analog control and status signals and a
4 transmit modulator having analog quadrature inputs and a
5 plurality of analog control and status signals are coupled
6 to a transmit processor having a digital output and a
7 plurality of digital control and status signals and to a
8 receive processor having a digital input and a plurality of
9 digital control and status signals by multiplexing analog to
10 digital converters and digital to analog converters such
11 that during a receive time the converters are used for a
12 receive purpose and during a transmit time, the converters
13 are used for a transmit purpose.

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